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SELECTED TRANSLATIONS ON EAST EUROPEAN HEAVY INDUSTRY (8)

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SELECTED TRANSLATIONS ON EAST EUROPEAN HEAVY INDUSTRY (8)

INTRODUCTION

This is a serial publication containing selected translations on the manufacturing and chemical industries in Eastern Europe.

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EAST GERMANY

ELECTRIC WORK EQUIPMENT

/Following is the translation of an article by a collective from VEB Werkzeugmaschinenfabrik Hermann Schlimme, in Die Technik (Engineering), Vol XVI, No 3, East Berlin, March 1961, pages 275-278./

The many electric work processes contribute considerably to the increase in productivity in almost all branches of industry. Electric work equipment usually increases the production efficiency to such an extent that the plants, machines, or tools are amortized within a short time.

The production program of the people's plant for machine tools "Hermann Schlimme" includes inductive high-frequency heating plants, dielectric high-frequency heating plants, spark erosion machine tools, supersonic machine tools and washing plants, and electrostatic precipitation equipment.

Induction Heating Plants

The design of these plants is geared to continuous production and to efficient application to work of many types of small parts. High-frequency oscillator valve generators with a maximum efficiency of 1, 4, 10, 30, and 100 kW and an approximate frequency of 400 kHz are manufactured. All generator models can be adjusted for different work pieces to be heated, so that they can be used for annealing, soldering or hardening, for melting, and for other heating tasks.

From the manufacturing program for heating machines, the multi-purpose heating machine model HfVM 320 (Fig 1) is remarkable. This machine is useful in the machine-building industry for the efficient heating of many different kinds of work pieces in one high-frequency plant, and also for soldering and tempering. Holding the work piece between centers for rotation of symmetric pieces, central holding, semi-automatic heating by coiler plate with the work piece rotating, if desired -- these are all possible.

By suitable program controls set with plug connections, the machine is equipped for stationary heating, constant-speed feeding, feeding with two independent speeds at accelerated recoil, feeding with programmed speed variation, and circulating spot-hardening. The machine is operated hydraulically; spur gear wheels, bevel wheels, gear parts, shafts, spindles, etc. can be hardened with the machine, and soldering and tempering operations can be carried out.

Multi-purpose heat treatment tool HfGe 30 (Fig 2) is especially for soldering, but also can be used for other kinds of heat treatment.

This device can be connected to any high-frequency generator from series 1 to 30 kW, according to the power required.

TECHNICAL DATA:

Diameter of work piece with central holding	max 400 mm
with coiler plate holding	max 80 mm
Maximum holding distance between centers	580 mm
Maximum extent of heating distance	320 mm
Maximum work piece diameter when held between centers	80 mm
Speed of work-piece drive	200 rpm
Feed speed, adjustable	0 to 100 mm/s
Maximum external diameter of cogwheel	400 mm
Minimum speed for circulating spot-hardening	0.2 rpm
HF heating time, adjustable	0 to 60 s

This is a standard device which contains all high-frequency transmission and control devices such as time switch gears, water valves, etc. in one unit. An attached work table with simple holding fixtures permits a quick changeover, so that the HfVGe 30 is suitable for the heat treatment of many different small-size work pieces.

For longer heating periods it is advisable to connect several tools to one generator; they are then alternately activated by high-frequency power in the work cycle.

TECHNICAL DATA:

Height of table		about 750 mm
Surface of table		600 x 250 mm
Time control		electronic
HF time	in coarse and	1 to 300 s
Cooling time	fine steps	1 to 300 s

Dielectric High-Frequency Heat Treatment Plants

In the field of dielectric heating with high frequency energy, the preheating of molding composites has definite advantages over other methods of treatment. A much better surface finish of the molded parts and greater mechanical strength are obtained. Also, production is increased because no ventilation is needed during the molding process, the pressure can be decreased, the molds have a longer life, and the passage speed is higher.

The preheating generator shown in Fig 3 preheats thermosetting plastics in tablet form or in powder form with the use of appropriate molds. The preheating time is set automatically by a short-time dial switch. The preheating output is 100 g/min, and larger quantities need correspondingly

more time.

Another dielectric device produced by VEB Hermann Schlimme is the high-frequency plant for welding and stamping PVC sheeting (Fig 4).

There are many different dielectric working methods, such as cementing and drying in the woodworking industry, age-hardening of sand cores in the foundry industry, thawing and heating in the food industry or other industries. The planning, design, and production of special plants for various purposes includes the extensive application of standard generators and construction elements.

The impulse-welding device model NSGe Wi 0.5 has proved to be especially effective for closing wrappings of thin and ultrathin thermoplastic sheeting. The heat is not generated in a high-frequency field in the material proper, but a controlled heat impulse furnishes the heat necessary for welding the plastic sheeting. The device is strongly built and simple to operate.

TECHNICAL DATA:

Heat impulse time according to material	ca 0.3 s
Width of welding seam	ca 3 mm
Length of welding seam, adjustable	200, 300, 400 mm

Spark Erosion Machine Tools

These machine tools are important, especially the well-known spark-erosion machine models ErF 0.5, ErF 3, and ErF 12, and the combined spark-erosive abrasive and cutting-off machine Er FTS, which is a modification of the machine ErFT (Fig 5).

The abrasive and cutting-off machine works hard and hardened electric conductors by means of a rotating electrode disk. Grinding operations can be performed in a vertical or horizontal direction. The surfaces worked by this machine have high tolerances and good surface finishes even with sharp-edged profiles.

TECHNICAL DATA:

Platen area	200x350 mm
Dimensions of grinding area	
vertical	max 150x200 mm
horizontal	max 150x250 mm
Weight of workpiece	max 40 kg
Disk diameter	max 150 mm
Adjustment precision	±0.01 mm

Special plants are built according to the requirements of the industry with an extensive use of standard construction elements. Special machines are used in the automotive industry, the steel industry, and others. (Fig 6).

Supersonic Working

For brittle materials which are not electric conductors, such as glass or ceramics, ultrasonic erosion working is especially suitable, but under certain conditions other hard and brittle materials, which may be electric conductors, are efficiently worked with ultrasonic energy.

Two assemblies are provided for this purpose; their excellent design guarantees high precision and a high-quality surface finish. The large machine tool device consists of the supersonic drill-press ErU 0.5 and supersonic generator HfGU 2 B, and is able to work a surface area up to 40 mm diameter. For precision work the plant contains generator HfGU 0.3 B and drill-press ErU 0.15.

Ultrasonic cleaning achieves results not possible with any other method. Even from blind holes and narrow slots, from the finest nozzle holes and other hard-to-clean grooves, dirt particles (grinding and polishing agents) are removed completely.

Cleaning equipment for the precision and watchmaking industry consist of supersonic generator HfGU 0.3 R (Fig 8) and supersonic cleaning instrument URGe.

This method is also suitable for larger workpieces. While for smaller pieces the supersonic frequency is 800 kHz and crystal is the sound generator, for large work pieces frequencies of 24 kHz are better, and magnetostrictive oscillators are used.

VEB Hermann Schlimme manufactures the supersonic generator HfGU 2 B, with a power of 2 kW and magnetostrictive oscillators which are connected according to the power output of the generator. This device completes the cleaning equipment, and several can be used in large plants.

Electrostatic Working

One of the most modern processes of surface finishing is the coating with paint or varnish by electrostatic spraying. This process has become more and more important in recent times; it introduces automation in the varnishing industry. This electrostatic spray method has great advantages over the usual method; some of the advantages are:
Savings in working time,
Savings in material,
Less investment for ventilation equipment,
Less investment for cleaning dirty parts of equipment,
Operation of plant by unskilled help,
Fully automatic feed of work pieces,
Improved quality of varnish coat
Healthy working conditions, etc.

The spray coating apparatus model EsFsp is designed according to new patented principles; it thus has a number of improvements over other models. A great savings in varnish is thus achieved, and large areas can be covered with one apparatus; there are simple adjustments for different types of work pieces, no problems in keeping the viscosity of the varnishes

constant, and no problems concerning the dosage of the spraying liquids -- all these are considerable advantages (Fig 9).

The paint is fed to the spray coating device by the paint conveyor EsFf. This conveyor includes the pump and containers for paints and solvent, which can be fed alternately.

High-frequency generators and switchboards are being built for electrostatic spray coating devices. The high-frequency generator model HfGS 120 is distinguished by its particularly small dimensions. However it is completely safe in operation because of the extensive application of cast resin.

The control desk EsSchp contains all-electric regulation and control elements. The desk also operates the conveyor, ventilation, drying plant feed, etc.

These last elements and the spray coating cabin are produced in close cooperation with VEB Sprio-Werke, Holzhausen, and VEB Leuchtenbau (Lighting Fixtures), Leipzig, and Central Development Institute Infrared, Berlin.

Illustration Captions:

Fig 1. HF Multipurpose Heating Machine Model HfVM 320
Fig 2. HF Multipurpose Heating Device Model HfVGe 30
Fig 3. HF Preheating Generator for Molding, Model HfGD 0.3 Wv
Fig 4. HF Pressure Welding Assemblage Model HfSP 200
Fig 5. Spark Erosive Cutting-Off Machine Model ErFT
Fig 6. Spark Erosive Special Machine for Working Concrete Rounds Rollers
Fig 7. 2 kW Ultrasonic Working Plant
Fig 8. 0.3 kW Supersonic Generator
Fig 9. Spray disk with Work Piece

EAST GERMANY

NEW MEASURING INSTRUMENTS FOR NUCLEAR PHYSICS

/Following is the translation of an article from material furnished by Scholz in Die Technik (Engineering), Vol XVI, No 3, East Berlin, March 1961, pages 222-224./

VEB Vakutronik, Dresden, holds a firm place in the measuring instruments industry as a developer and producer of control and measuring instruments for nuclear physics. For the first time, this firm, during the last few years, has begun the advance production (small series) of measuring instruments within the development department, before mass production; this permits the quick delivery of instruments which are urgently needed by certain industries. On the other hand, the experience gathered from the customers in using these instruments can be utilized in further development. Careful inspection and qualification tests are carried out by electronic and a physical testing laboratories at this early stage.

Besides radiation detectors such as Geiger counters, ionization chambers, and scintillation counters, they also manufacture pulse counters, mean value indicators and complete radiometric installations for laboratories. The firm further plans and produces weight-per-unit area-gages for the paper and foil industry and gamma relays for radiation barriers with radioactive isotopes in industrial control and regulation engineering.

At this year's Spring Fair at Leipzig, a number of new developments and improvements from this program will be shown which demonstrate the progress achieved in the building of such instruments and the continuous expansion of the model assortment according to the requirements of industry.

Radiation Measuring Instruments for Laboratories

The series of radiometric installations was supplemented by a new model. Scintillation spectrometer VA-M-12 (Fig 1) determines the radiation of radioactive substances, measures their intensity, and even determines the distribution of energy. The following elements of the instrument assemblage combine into a radiometric installation:

Universal scintillation meter head	VA-S-961
Spectrometer amplifier	VA-V-84
Single-channel analyzer	VA-W-01
Inserted automatic attachment	VA-G-13
Electronic counter	VA-G-22D
Electronically stabilized high-voltage source	VA-B-05

The scintillation meter head to be connected to the installation is equipped with a NaJ (Tl)-crystal, model M 12 FS (VEB Carl Zeiss, Jena). The high voltage necessary for its operation is furnished by the electronically stabilized high-voltage source VA-B-05. The two voltage ranges, from 200 to 800 V and 600 to 2000 V, permit an adequate supply of voltage for the highly sensitive radiation detectors, with a nominal error of $< 0.1\%$ at $\pm 10\%$ voltage variation of the mains and a delayed time error of $< 0.05\%$.

The impulses of the scintillation meter head are fed to the spectrometer amplifier VA-V-84 which has a maximum amplification of 74 dB (5000 times) and a constancy of $< 2\%/24$ h.

The built-in single channel analyzer VA-W-01 permits the selection of the pulses according to their peaks over a range of 5 to 100 V. A channel ranging between 0 and 10 V can be set and step-controlled either by hand or automatically. With an initial pulse value of 10 V, the pulses are fed to the built-in electronic counter with a pre-set count switch, a synchronized stop watch, and a resolution time of 10 μs. The number of pulses is indicated by five decade counters equipped with tube S 10 S 1 (VEB Funkwerk (Radio Equipment), Erfurt).

An attachment parallel-connected to the electronic counter directly indicates the mean impulse density and, with a recording device attached, automatically records the chronological sequence of the mean value.

In this case the built-in automatic parts in the spectrometer are particularly useful because they automatically advance the channel between 1 and 99 V. Measuring intervals of 0.25, 0.5, 1, 2, 4, or 8 minutes are pre-set by a built-in timer with a maximum error of $\pm$ 2%.

The fully automatic recording of the integral pulse value spectrum is performed by the inserted automatic parts with a pulse density meter and recorder. If an automatic sample changer and record printer are connected, a complete measurement series can be carried out without supervision.

Especially important in the application of the scintillation spectrometer VA-M-12 is the fact that this instrument permits the exact determination of the distribution of energy in certain radioactive substances; this makes it especially useful in nuclear physics research. Because of these possibilities the scintillation spectrometer also permits the selection of the characteristic energy of a radiation emitter, for instance the 363-keV-line of the J-131, so that disturbing impulses resulting from noise or scattered radiation are eliminated. This instrument is therefore suitable for medical purposes, because the increased sensitivity permits a reduction of the radioactive substance applied as compared to other measuring processes.

Simple and handy measuring instruments are especially suited for institutes, teaching and instruction, and small laboratories. The small radiometric instrument VA-M-14, created especially for these purposes, is shown in Fig 2 with the new built-in electronic pre-set time switch. This is an improvement of the instrument shown last year which eliminates additional time measurements in many cases. The pre-set

measuring time points correspond to those of the scintillation spectrometer VA-M-12.

The well-known radiometric stations VA-M-12 and VA-M-16 were considerably improved in design in cooperation with the Academy of Applied Art, Berlin-Weissensee, by applying new technological principles. In order to achieve a clear and unequivocal designation of the operating elements and indicators, the face plates are now coated with light varnish and lettered by screen printing. This provides an attractive appearance for these modern instruments.

Fig 3 shows radiometric station VA-M-15 with scintillation meter head VA-S-971 attached to a stand. This stand is a part of the fixtures and screening devices being developed for all types of radiation detectors. The standardization which has been introduced in this field will guarantee the efficient and simple operation of the devices. Fig 4 shows an example from the series of screening units.

Measuring Instruments for Radiation Protection

Radiation surveying instruments require small, handy dosimeters which are independent from commercial power. The new "Aktimeter" VA-J-13 is shown in Fig 5. This is a fully transistorized instrument for dose-rate measurements from 0.01 to 500 mr/h (for a gamma energy of about 1 MeV). It is equipped with an exchangeable hand probe with beta window, so that gamma rays can be measured separately. The strong water-tight design withstands temperature ranges from - 10 to +45°C and permits an uninterrupted operation for 50 h. Batteries provide the power.

Illustration Captions:

Fig 1. Scintillation Spectrometer VA-M-12
Fig 2. Small Size Radiation Measuring Instrument VA-M-14
Fig 3. Radiation Measuring Station VA-M-15 with Scintillation Meter Head VA-S-971
Fig 4. Screening Element
Fig 5. "Aktimeter" VA-J-13

EAST GERMANY

SHIPBUILDING IN THE GERMAN DEMOCRATIC REPUBLIC

/Following is the translation of an article from material furnished by Goldbeck in Die Technik (Engineering), Vol XVI, No 3, East Berlin, March 1961, pages 267-269./

Shipbuilding is one of the youngest industries of our republic. A new industry has been developed since 1945 from one shipyard for oceangoing vessels and seven shipyards for inland ships. The 5100 workers then employed have increased to 40,000. Workers, engineers, and clerical employees of the shipbuilding industry have achieved great successes. 2605 vessels with over 1.1 million reg. t. were delivered between 1946 and 1960. Large-scale repairs and remodelling have furnished another 400,000 reg. t. during the same period.

Great tasks confront the shipbuilding industry as outlined in the Seven-year Plan on the basis of the results thus far achieved. The shipbuilders are working toward their goal with great zeal. The collective display of the shipbuilding industry at the Leipzig Spring Fair of 1961 shows the production program for our shipyards according to the Seven-year Plan.

The latest and most important objects are exhibited here: passenger ships, freighters, fishing vessels, and ships for inland waterways. The passenger-ship program is the most important one. VEB Matthias-Thesen Werft (Shipyard), Wismar, is specializing in passenger ships. The firm has gathered extensive experience in the mass-production of passenger ships for inland waterways, of which 41 have been delivered to customers. They have now begun the building of oceangoing passenger ships with a power of 8000 hp (Fig 1). Eleven of these have been delivered, and another 11 will follow by 1965. With a length of 122 m and a width of 16 m they offer space for 300 passengers. The service speed of the ships is 18 knots. The good design, the attractive, elegant interiors of cabins and lounges, and the extensive use of plastics were widely commented upon by experts from the western world.

These ships have become internationally known, since they travel the Leningrad-London route. The FDGB (Freier Deutscher Gewerkschaftsbund - Free German Labor-Union Association) vacation ship for 400 passengers, which will be in service by 1 May 1961, is another product of the Matthias-Thesen Werft. On the basis of the experiences gathered in the building of the 8000 hp oceangoing passenger ships, a freight and passenger ship for 750 persons is planned; a functional prototype may be seen in the water basin in front of the pavillion of the shipbuilding industry. This is a single-class freight and passenger ship with twin propellers, for export. Cabins and lounges are decorated in contemporary style with an extensive

use of fireproof or fire-retardant materials. This 18,500 ton ship is the largest object yet built in the ship yards of our republic. The program of the Matthias-Thesen Werft also includes passenger ships for inland waterway traffic. Fig 2 shows one of these units with 1200 hp, 95.80 m long, 14.30 m wide, gross volume of 2470 reg. tons, speed of 23.7 km/h, sleeping accomodations for 343, sitting room for 495 persons.

Only the most important of the many fishing vessels built in our shipyards, a few of which may be seen as models at the fair, will be discussed here..

The fishing and processing vessel built at the Matthias-Thesen Werft will help to improve the supply of fresh fish for the people of our republic. With modern catching, processing, and conservation equipment, this ship is superior to similar ones on the international market. By 1965, eleven ships of this type will have been delivered to the fish combine (Kombinat) at Rostock.

The refrigerated fishing vessel model "Tropik" from VEB Volkswerft (People's Shipyard), Stralsund, is for tropical waters. It is equipped for usual fishing, and also for tuna fishing, catching sardines, and ringwade fishing with dory boats. The large processing and conservation plant guarantees high-quality, fresh fish. More than 30 t of sardines can be frozen within 24 hours in the three freezer tunnels. A plant for making fish meal is built-in for processing incidental catches and waste; it has a raw material capacity of 20 t per day. The liver-oil plant has a capacity of 3 t of liver per day. The ship can remain at sea independently for 60 days. Since it is intended for use in a convoy where it can remain at sea for several months, the crew is housed in comfortable one- and two-man cabins with modern interiors. A comparison with other ships of this type shows that nothing like the "Tropik," with its universal fishing equipment, has yet appeared on the world market.

The medium trawlers mass-produced for export in series of 171 ships by Volkswerft (People's Shipyard), Stralsund, should be mentioned here (Fig 3). With a length of 50.8 m, this model is an improvement over the logger. Provided with modern fishing equipment and an adjustable propeller, it fulfills the requirements of the fishing industry. Ships of this type have brought in excellent catches. Their seaworthiness has been proven in numerous occasions during heavy storms in the northern seas. These units carry 265 tdw, the power is 540 hp, the speed, 12 knots.

We would also like to mention the steel cutter from the Ernst Thaelmann shipyard, Brandenburg, which is exported mainly to such northern states as Denmark, Sweden, and Iceland. The ships delivered so far have pleased the customers by their modern design and excellent maneuverability.

Another important part of the production program of our shipyards are the freighters which are built at the Neptun shipyard at Rostock (up to 5000 tdw) (Fig 4), and at Warnowwerft, Warnemuende (over 5000 tdw). Shipyard Neptun has for several years produced 3000 reg. ton freighters. Originally fuelled with coal, and an intermediate model with oil fuel, this ship is today a modern diesel motor freighter. While 31 ships with diesel engines have already been delivered to customers, another 43 will be

delivered by 1965; these will have diesel engines acting directly upon the propeller shafts.

Warnowwerft has produced motor freighter 13,000 tdw (Frieden class), the mass-produced freighter 11,200 tdw, and the coal and ore freighter 9500 tdw. With a length of 157.6 m, the ships of the Frieden class (13,000 tdw) are at this time the largest freighters built in our shipyards. The first of these was launched in 1956, and today 13 such ships are in use, mainly for East Asian traffic. This ship, with its completely welded construction, is distinguished by its elegant lines, beautiful shape, and careful design (Fig 5).

The coal and ore freighter 9500 tdw, for export, has the same qualities. A prominent, streamlined bow and the upper deck arrangement with a smokestack and signal mast on the stern bridge add to the attractive appearance of the ship. It is built especially for the transport of bulk goods, and has five storage rooms of approximately equal size with slanted side walls. The hatches are large and exceptionally wide in order to insure rapid cargo changes. Four gripper cranes are placed between the hatches for the loading and unloading of coal. The ship is 135.5 m long and has a low-speed diesel engine of 5400 hp and a service speed of 14.3 knots.

The 11,200 tdw motor freighter is based on the design of the coal-ore freighter. Intended for shipping bulk goods, the vessel has seven compartments in the hold; four of them are small, for holding ore. Next to the compartments, with the exception of the front one, there are side tanks with sloping longitudinal walls, which help the self-balancing of the cargo. The hatches are covered by mechanically activated sliding steel covers of the Wenzel-Bauer type developed in the GDR. A low-speed diesel engine, which acts directly upon the propeller, has a power of 5850 hp and produces a service speed of 14 knots; the ship is 151.7 m long. Supplies and fuel are intended to last for a distance of 13,000 nautical miles. The crew of 49 is housed in the upper deck at the stern. The cabins and lounges have a contemporary decor with extensive use of plastic materials.

Of the many ships for inland water traffic, only those most characteristic of the production of our shipyards can be mentioned here. Shipyard Edgar Andre, Magdeburg, has built motor freighters of 700 t, of which 50 are to be delivered by 1965; these and the 860 t motor freighters and tankers for inland waterways built by Rosslauer Schiffswerft (Rosslau Shipyard) and Elbewerft (Elbe Shipyard), Boizenburg, prove that the builders of ships for inland water traffic do not take second place to the shipyards for oceangoing vessels. Their successful plan fulfillment and the quality of their work contribute decisively to the solution of the problems confronting the shipbuilding industry and the entire economy of our republic; but beyond this, they have also found recognition in foreign countries.

The workers of the inland water-traffic industry have proved that they can also build such oceangoing vessels as the 400 hp ocean tugboat from the Edgar Andre shipyard, Magdeburg. By 1965, one hundred of these will have been delivered to purchasers. Another is the ocean bucket-dredge model 805 from the Rosslau shipyard. Three of these were exported in 1960,

and the Seven-year Plan provides for ten more. This vessel, 60.4 m in length and with a split stern, has an automatic bucket chain dredge. The stability of the ship permits its working and sailing fully equipped in winds up to a velocity of 5. The dredge can be used as far as 100 nautical miles away from the coast. The capacity at the standard working depth of 14 m is 400 m^3/h. The ship is driven by a diesel engine and electric power. Four diesel generator assemblies of 300 hp each, and one of 90 hp, furnish the power for both sailing and working. The two propellers are driven by electromotors of 350 kw each. The most important dredge parts are controlled from a control station. Side winches and upper winding-drum gear are controlled by a Ward-Leonard circuit with a wide control range. The supplies are intended to cover 39 uninterrupted working days and 18 sailing days.

The high technical standard and quality of our ships prove the efficiency of our shipbuilding industry and the creative powers of our shipbuilders, which are allowed to operate freely in our workers' and peasants' state. The Seven-year Plan provides for a 148.2% increase in gross production between 1958 and 1965; this confronts our shipyard workers with great problems, which can be solved only if all cooperate.

Illustration Captions

Fig 1. Oceangoing Passenger Ship 8000 hp
Fig 2. Passenger ship for Inland Waterways 1200 hp
Fig 3. Medium Trawler 540 hp
Fig 4. Motor Freighter 4300 tdw
Fig 5. Motor Freighter 13,000 tdw with Full Deck

EAST GERMANY

DIESEL ENGINES

/Following is the translation of an article from material furnished by Beyer in Die Technik (Engineering), Vol XVI, No 3, East Berlin, March 1961, page 266./

As in previous years, the products of the people's diesel-engine industry of the German Democratic Republic are shown in a collection in Hall I at the Technical Fair. Because of the number of engines exhibited, it is not possible to treat them all individually in this article. We shall therefore report only some of the latest developments.

VEB Motorenwerk (Engine Works), Cunewalde, displayed models 1 KVD 8 SL and 2 KVD 8 SVL from the new series KVD 8. These are air-cooled, four-stroke diesel engines with one or two cylinders. The one-cylinder engine has an upright cylinder, while in the two-cylinder engine they are arranged in a V-shape. The V-angle is 90°. The engines have a traverse and bore of 80 mm. The power is 6.5 and 13 hp with a speed of 3000 rpm. This corresponds to a mean piston pressure of P_e=4.9 kp/cm^2.

The engines are manufactured according to the latest developments with a high degree of standardization. This was possible especially because of the extensive use of the erector set system in the transition from the upright one-cylinder design to the two-cylinder V design. 94.5% of the manufactured parts and 97% of the standard parts of the one-cylinder engine are used for the two-cylinder engine.

The crankcase is a hood made of light metal. The forged crankshaft is very strong, with forged, counter weights, and corresponds to the specifications of the ship-building classification associations. Crankshafts and connecting-rod bearings are lead bronze sleeve bearings. The light metal piston has three packing rings and an oil stripper ring. The drop-forged connecting rod is diagonally split at the bearing. The cast iron cylinder has cast cooling ribs. The light metal cylinder head has shrunk-on cast iron valve-seating rings and a two-compartment eddy chamber. Injection devices are a self ventilating slip-in injection pump and a standard small-size nozzle holder with a throttle-pin injection nozzle. The speed can be regulated either with an adjustable governor for an operating speed range of 1500 to 3000 rpm, or a two-stage governor. The engine is started either by hand or electrically. Cool air is generated by a flywheel blower. The power delivery can be at either end or simultaneously at both ends of the crank shaft, and half speed (full power output) from the cam shaft. The weight per horsepower for standard design (manual starting) is 10.46 kg/hp for the one-cylinder engine and 6.6 kg/hp for the two-cylinder engine.

VEB Dieselmotorenwerk, Leipzig, shows a new ship's engine set with the diesel engine 6 NVD 21. Motor and reverse reduction gears are connected by a flexible bolt clutch and mounted together on a common frame. The engine power is 140 hp with 1000 rpm, or 168 hp with 1250 rpm. The driving gear has a reduction proportion of 1:2. Thus the propeller shaft has a speed of 500 or 600 rpm.

The hydraulically controlled reverse reduction gear can be controlled by an attached switch lever or by a rope directly from the control stand of the ship. An oil cooler is built in for cooling the oil in the gear. The axles of the input and output shaft are staggered.

The engine has an additional oil pump, so that even with heavy inclination a safe operation will be guaranteed. The engine is started by compressed air or by an electric starter. The cooling system is designed for indirect cooling or for sea-water cooling. Driving gears of this type are also manufactured with two, three, and four cylinder engines. The reduction gear is proportioned from 1:1.4 to 1:2.5 for various purposes.

From the production of VEB Schwermaschinenbau (Heavy Machinery) Karl Liebknecht, Magdeburg, diesel engine 8 NVD 36A, with an output of 560 hp at 500 rpm, is especially interesting. This engine is an improvement on the model of the same designation with 420 hp at 360 rpm. It has light metal pistons and three-metal-bearings. The engine also has an exhaust turbo supercharger model N 3 from VEB Kompressorenbau (Compressor Building), Bannewitz.

The engine comes in stationary design or as a ship's engine. The ship's engine features direct reversibility and, if necessary, a built-in pressure bearing. The cooling system is for indirect cooling. Because of the single-lever control, remote control from a central control station is possible.

VEB Dieselmotorenwerk, Rostock, presents an interesting model of the ten-cylinder diesel engine K 10 Z 70/120 A. This engine is the largest model of a series of single-action, two-stroke crosshead engines, which are being manufactured by license agreement with MAN at the Dieselmotorenwerk, Rostock. The engine has 9050 hp at a speed of 130 rpm and is equipped with an exhaust turbo supercharger. Engines of this series in a seven-cylinder design are built into coal and ore barges built by VEB Warnowwerft (Warnow shipyard), Warnemuende.

EAST GERMANY

HIGH VACUUM ENGINEERING

/Following is the translation of an article by Ing. W. Grellmann in Die Technik (Engineering), Vol XVI, No 3, East Berlin, March 1961, pages 231-234./

The industry of high vacuum engineering fulfills an urgent need in our economy, a need which will decisively influence future developments. Many of our present scientific, technical, and economic problems cannot be solved without high vacuum engineering. Its influence will extend to almost all branches of industry in the future. Let us give some examples:

In metallurgy, in the melting, annealing, and sintering of high-alloy steels and special metals, the purity is increased; thereby better metallurgical qualities are achieved. In the electric industry, vacuum drying and impregnation of transformers, as well as the outgassing of oils, will achieve favorable electric coefficients.

Also, for decades, vacuum engineering has been used in radio communication, television, and in precision and optical mechanics. Lately, semi-conductor and nuclear engineering and many other fields have become important users.

The tasks of the high vacuum industry are now fulfilled in the GDR by VEB Hochvakuum (High Vacuum), Dresden, VEB Geraer Kompressorenwerk (Compressor Works, Gera), and VEB Carl Zeiss, Jena. Also, the firm Dreyer, which has lately come under partial management of the government, and Holland-Merten, Sangerhausen, are systematically working on this problem.

Many scientific institutes are working for this industry: the Institute for Instrument Building, Berlin, and the research institute Manfred von Ardenne, Dresden.

Standardization

From the beginning, the standardization of construction elements was stressed. Thus the nominal widths of the suction and pressure connections are standardized in a series of 20, 32, 50, 65, 100, 150, and 250 mm, with the flange dimensions for these nominal widths contained in TGL 26-1004. For the supporting rings for these widths, the dimensions are taken from TGL issue 26-3004.

Special research on round rubber gaskets is done by VEB Kautasit in order to develop a special quality of rubber for vacuum engineering. TGL 6365, which contains possible dimensions and quality grades for the gaskets, was created in cooperation with the aviation and hydraulics industry. A series of round rings for vacuum engineering is determined in TGL 26-3005, corresponding to the standardized flange connections.

Construction Elements

Hand-Operated Angle Valves

For vacuum plants with nonautomatic evacuation, hand-operated angle valves are often needed. Fig 1 shows the series of valves of this type from NW 20 to NW 100. The series also includes NW 150.

In the development of these valves the chief consideration was to remove the valve disk completely from the flow range when the valve is open, in order to obtain a favorable guide value. The angle was kept as small as possible so as to obtain a better guide value by shortening the flow route. Hand-operated angle valve NW 20 has been individually manufactured from Cr-Ni-steel to obtain better resistance against corrosion when exhausting corrosive gases.

The valve disk is moved by a hand lever through a spindle and spindle nut with a high pitch so that the valve is fully opened with five to six turns of the hand wheel. The valve seat is sealed by a O-ring, and the rotary lead-in is vacuum-sealed by two WFA rings. With these sealing elements the valve can be used up to a temperature of 80°C.

Priming Pump Protector Valves

Priming pump protector valves are usually built into all vacuum plants in order to separate the priming pump from the plant and provide immediate ventilation in case of plant cut-off or power failure. This prevents the oil from the priming pump from being pushed into the plant by atmospheric pressure. Fig 2 shows the design of priming pump protective valve NW 65. The valve works according to the following principle:

The priming pump evacuates the space within the valve up to the closed valve disk to about 50 Torr [icellian vacuum]. When this pressure is reached, the valve disk is moved from its seat by spring action so that free passage is secured for the gases. The upper part of the valve contains a small magnetic ventilation valve which opens when there is a power failure or when the pump is cut off. Atmospheric pressure then becomes effective and presses the valve disk upon the valve seat; the pump is ventilated slowly through a ring slot which is obtained from the tolerance of the moving parts.

Motor Controlled Passage Valves

All program-controlled vacuum processes need mechanically controlled angle or passage valves. The mechanic control may be driven by motor, magnetic, hydraulic, or pneumatic power.

In agreement with VEB Carl Zeiss, Jena, where angle valves are being developed, the VEB Hochvakuum builds motor-controlled passage valves. These passage valves have the advantage of being built very low, so that the flow route is small, with a completely unobstructed gas passage. They are therefore also suitable as closing devices for sluices which are

absolutely necessary in continually operating vacuum plants. For this type of valve, model series NW 50, 65, 100, 150, 250, and 500 was developed. Sizes up to N 250 will be ready by 1961.

The closing and opening time for these valves is about 8 s. The electric equipment of the valve indicates the closed or open state.

Hand-Operated Ventilation Valves

Fig 3 shows the design and size of a small hand-operated ventilation valve. A boring of 8 mm max diameter is provided for ventilation. The valve is connected by standard flange NW 20. The ball knob indicates whether the valve is opened or closed.

Hand-operated ventilation valves are used in all nonautomatic vacuum plants, and this design will fill the recurrent requests from industry.

Spring Gaskets

In vacuum engineering it seems efficient and necessary to build spring gaskets between priming pumps and the main plant, possibly in other places as well. These gaskets equalize vibrations, especially those of the priming pump. Furthermore, they balance longitudinal expansion and construction tolerances, even equalizing small displacements in the centers of the pipe-lines. Fig 4 shows such a spring gasket. It consists of a corrosion resistant CrNi St corrugated pipe with a wall thickness of 0.2 mm and flanges on either end. The model series comprises nominal widths from 20 to 150.

Plants

Pump Stations

As said in the introduction, high-vacuum engineering during the next few years will be much more widely used in different industries. Its task is to help solve various technological problems.

The pump station shown in Fig 5 is intended as a prerequisite for laboratory tests in connection with technological problems.

This pump station consists mainly of a priming pump with a suction speed of 4 or 10 m^3/h, and an oil diffusion pump from VEB Carl Zeiss, Jena, with a suction speed of 120 liters/s. A built-in program valve with measuring instruments facilitates the operation of the pump station. Various attachments such as the receiver disk and bucket, and assembly lattices for the easy mounting of additional glass apparatus may be ordered.

These pump stations can be used for many purposes, except for vaporization and vacuum drying when a high degree of humidity develops.

Vacuum Melting Plants

For metallurgical purposes, a vacuum melting plant with inductive

heating and a crucible volume of 1.5 liters was developed. The inductive heating is performed by an 8000 Hz medium frequency aggregate with a power of 56 kW. The evacuation is performed by two series-connected root pumps with a suction speed of 1500 m^3/h and a rotary slide valve priming pump of 150 m^3/h. This achieves a working vacuum of 10^{-3} Torr. The series-connected root pumps afford a favorable suction speed, which even with 10^{-4} Torr still achieves a rated output of 1500 m^3/h.

Fig 6 shows the diagram of the arrangement of the plant. The pumping process is pressure-controlled according to a control plan. A charging attachment permits the production of selected alloys, whereby the alloy components which evaporate easily need not be added before almost the end of the melting process.

Vacuum Annealing Plants

VEB Hochvakuum has developed a vacuum annealing plant especially for metals with a high melting point. Temperatures of 2000 or 2500°C are attainable. The maximum volume of material to be annealed at the above temperature is 180 mm (width) times 300 mm (length), or 100 mm (width) times 200 mm (length). The connected power for heating is given as 160 kW.

The recipient is evacuated by pressure-dependent program control. The pumping station consists of a diffusion pump 5000 liters/s, a root pump 1500 m^3/h, and a priming pump 150 m^3/h. The diagram of the plant is given in Fig 7. This arrangement of the pumping station makes it possible to keep the working vacuum within a range of 10^{-6} Torr. The plant is designed so that the raising of the cover and the lowering of the annealing material are activated by hydraulic power.

Halogen Leak Finder

The total leakage of a piece of equipment is an important factor in vacuum engineering, especially in the high vacuum range. It is often difficult and time-consuming to trace the location of the leakage.

In order to facilitate this tracing, a halogen leak finder (see also Wienecke, B. "A Universal Halogen Leak Finder for Vacuum and Over-Pressure Plants," Die Technik, XV, 12, 1960, pp 808-813) was developed (Fig 8). This device detects leakage by placing a diode in the evacuated space and spraying the plant from the outside with a test gas. This test gas enters the evacuated space at the leakage and causes an electric effect (Rice-effect) at the diode which is indicated optically and acoustically. Thus, the location of leakage is found.

Summary

The above contribution is only an incomplete survey of the developments of VEB Hochvakuum. All persons interested in vacuum plants are advised to contact VEB Hochvakuum concerning advice in the solution of their specific problem

Furthermore, ZEK Pumps and Compressors KEB, [abbreviation unexpanded in source] Zwickau, is developing mechanical pumps such as the rotary slide valve and root pumps. These will be produced by VEB Geraer Kompressorwerk. Inquiries concerning this special field should be addressed to these plants directly.

Illustration Captions

Fig 1. Model Series of Hand Operated Angle Valves NW 20 to NW 100
Fig 2. Priming Pump Protective Valve NW 65
Fig 3. Hand Operated Ventilation Valve NW 20/8
Fig 4. Spring Gaskets
Fig 5. Pumping Station
Fig 6. Diagram of Inductive Vacuum Melting Plant
Fig 7. Diagram of Vacuum Annealing Plant
Fig 8. Halogen Leak Finder

EAST GERMANY

NEW INSTRUMENTS FROM VEB CARL ZEISS, JENA

/Following is the translation of an article by Dipl. Ing. Dr. Ing. H. Schrader in Die Technik (Engineering), Vol XV, No 3, East Berlin, March 1961, pages 235-239./

Every year the Technical Fair in Leipzig furnishes an opportunity for presenting new instruments for comparison, evaluation, and criticism by international experts. Here we can determine the place which new developments occupy in the scale of comparable instruments by world standards. This year again VEB Carl Zeiss, Jena, presents new products from various production groups of its far-reaching program; these are the results of completed research and development projects.

The non-destructive testing of materials with ultrasonic instruments has become an important factor in test engineering during the past few years, especially in the testing of forgings, sheet metal, pipes, and welding seams. Very recently VEB Carl Zeiss, Jena, has developed two new methods on the basis of pulse reflection, whereby the reflections no longer appear as pips but are seen in pictures; these are particularly informative because of their two-dimensional presentations.

The rotation method tests cylindric work pieces (rollers, axles, pipes with wall thicknesses over 3 mm) which slowly rotate around their vertical axis while a sound transmitter slowly moves along the work piece, which is thereby irradiated. The rotation of the work piece is transmitted to the electrongun system of a cathode-ray tube by mechanical or electric coupling; the cathode ray rotates synchronously in the same way, recording on the luminescent screen a glare-controlled picture of the test piece cross section at the momentary position of the sound transmitter. The outline of the test piece and the defects (cracks, cavities, porosity, structural changes) are shown as brighter lines, dots, and areas. This clear picture of the defects in a test piece can be photographed with a miniature camera for later evaluation.

The swing method is especially suited for testing plate metal and other work pieces with straight edges. Built-in pipes, pressure bottles, or work pieces rounded in one direction can also be tested with the device, as well as the wall thickness of built-in pipes and pressure vessels, which is often unknown. The picture is obtained by a straight swinging motion of the sound head over the test piece, based on the same electrical principle as used in the rotation method. This process allows a much more efficient testing of the entire work piece than scanning by sound head with a regular reflectoscope.

The Sonovisor 2 is a unique instrument (Fig 1) which permits testing by the swing or rotation method and also, after simple switching,

by the classic scanning method (scanning sound transmitter). By exchanging an inserted attachment, the instrument, which usually runs on A C, may be switched to a 12 V battery, so that it becomes a portable ultrasonic testing device to be used in the shop as well as in the field. The use of transistors and printed switch diagrams contribute to the instrument's small dimensions and very low weight (15 kg). It can be comfortably moved through the entry holes for the examination of vessels and containers.

Zeiss Supersonic Intensity Meter

This small instrument, working on the principle of radiation pressure for the frequency range 0.4 to 10 MHz (Fig 2), is universally applicable for measuring the radiation intensity of supersonic heads, built-in, immersion, or therapeutic sound transmitters, and also for measurements in the free supersonic field. There are two different designs, and the intensity range is 0.01 to 10 W/cm^2.

High Vacuum Vaporization Apparatus HBA2 (Fig 3)

This plant is intended for various coating processes involving vaporization, especially vacuum preparation in light and electron microscopy. Processes such as thermic vaporization, cathode sputtering, glow discharge, and carbon vaporization according to Bradley, can be carried out in this apparatus and are easily supervised through the protected glass recipient of 250 mm diameter. The oil diffusion pump HVPO-120 (120 liters/s), the program controlled valve combination PV 65, and the automatic priming pump valve VVma 2^o guarantee simple and safe operation. The powerful vacuum equipment has a short evacuation time and thus makes a rapid change of batches possible. The mechanical equipment corresponds to the requirements of modern preparation processes, consisting of three lead-throughs, a finely adjustable gas inlet with needle valve NV 20 Torr liters/sec., and an object holder with cartridge for 3 x 5 electron microscope preparations; five preparations at a time can be exposed to the vaporization jet under vacuum. The vaporization angle can be adjusted from the outside. Movable and fixed orifice plates for screening and limiting the steam jet and two fixtures for heat evaporation are mounted in an adjustable and easily exchangeable arrangement.

The measuring of threaded screws to be used as tail or lead screws requiring special precision is an important task for which the only reasonably efficient instrument has been a universal measuring machine, since no suitable specialized instrument has been developed.

Pitch Gage for Lead Screws

This design (Fig 4) is equally suited for the test room and the shop. The test pieces are compared to a built-in glass gauge; as in length gauging machines, a special optical system known as the Eppenstein

principle permits a reading free from guide errors, and also reduces the length of the machine body. A metal scale on the guide bed permits the rough calibration and setting of the measuring carriage in the desired position. The spiral microscope, well-known from other instruments, with a scale reading of 1 m, whereby 1/10 m can be easily estimated, serves for reading the glass gauge.

Theodolite 120 (Fig 5)

This new instrument will be of special interest to surveyors; it is intended for low precision work and performs various tasks, not all of them geodesic. The small size theodolite is especially useful in construction engineering, forestry, and mine surveying, for simple geographic, geologic and geophysical tasks, for simple city surveying tasks, cadastral surveys, simple technical problems in above and below ground construction, architectural problems, and also for supplementary or orientational data in photographic plotting. Theodolite 120, with a telescope of great brightness and contrast, and with an easy-to-read, indexed range finder, is especially suited for these tasks. The device has compulsory centering and can be set up in any standing or hanging position.

Reducing Tachymeter 006 with Station Basis (Fig 6)

This is a double-image range finder with station basis and automatic reduction of inclined distances in the horizon. Within a range of 2 to 60 m, it is possible to determine horizontal or inclined distances without erecting laths in the reference point; this makes the device especially suitable for surveying in built-up areas. The mean error in horizontal direction or zenith distance is $\pm 40^{cc}$, the mean error for a distance measured with double coincidence is $\pm 0.06\%$ of the distance. The tachymeter is a special precision instrument for polar detail photographs for cadastral surveying, engineering problems, topographic-tachymetric recordings, architectural measuring, and angle measurements in traverse surveys.

Stereometrograph

The program for photogrammetric instruments of VEB Carl Zeiss, Jena, is enriched by two new instruments which provide expanded and simplified high precision services for photogrammetric institutes. The stereometrograph (Fig 7) is a new, two-picture mapping device of high precision for the point and line evaluation of vertical aerial photographs up to a size of 230:230 mm in a scale of 1:2000 to 1:25,000. The device works on the principle of mechanical projection with space adjusters and frontal picture viewing. The device is intended for the graphic and numerical individual model plotting of normal and wide-angle, vertical aerial photographs of all usual formats and camera constants. The

instrument has no aero triangulation equipment, in consideration of the low price and the very specialized application in photogrammetric mass production. The emphasis is on high precision, simple and efficient operation, and on the feasibility of connecting an automatic recording and calculating device. In its self-contained, compact design, the stereometrograph is the first photogrammetric plotting instrument which is protected against mechanical damage and contamination by dust and dirt, so that long life and constant precision are guaranteed.

Zeiss Coordimeter (Fig 8)

This program-controlled recording and calculating device for photogrammetric plotting instruments automatically records machine coordinates and performs program-controlled calculations; it is thus a further step in the automation of photogrammetry. The important fact is that with comparatively little added investment the range of application and efficiency are considerably increased, compared with the usual recording devices of this kind. The coordimeter permits the direct transition from machine coordinates to the final plotted coordinates without intermediate recording. Thus it solves problems which so far were handled only by relatively expensive electronic or automatic relay instruments. The coordimeter records, processes, coordinates, and, as a new development, it automatically determines corrections for orienting the stereo models.

This means the solution of one of the problems of full automation of the orientation process. The instrument is very simple to operate, since the calculations are firmly programmed by means of program cylinders and control rails, which can be exchanged in a few simple operations by the researcher. The device can be connected by electric transmission channels to the stereoscopic plotting instruments stereoplanigraph and stereometrograph, or they may be used independently as a calculating device. The coordimeter consists of two units: the indicating and controling device, with the sub-groups counter and function generator receiver, coordinate indicator and operating keys, counting train register and program control, and the calculating and registering device, with the sub-groups electric typewriter, constant units, arithmetic unit, and memory unit. A tape punching device for recording the results on punched tapes can be connected if desired.

The coordimeter will considerably increase the efficiency of numeric photogrammetry.

Medical Instruments

In conclusion, we would like to discuss a few new developments in the field of medical instruments. The electrokymograph (Fig 9) records the movements of the heart, large blood vessels, or volume pulsation of the lungs in x-ray observation. The instrument, which in connection with an electrocardiograph forms a self-contained installation, can be adapted to any medical x-ray apparatus. A photo multiplier

receives the radiation of the small light vibrations originating in a limited area of the x-ray screen, and its output signal controls the measuring-point amplifier and recording system of the electrocardiograph. When the results of investigations by Strand and Kraus in Germany and Marchal in France have been confirmed on a broad basis, the electrokymograph will become an important factor in the early diagnosis of bronchial cancer. For the improvement of surgical technique and the development of further surgical operations in oto-rhino-laryntology, where enlargements up to 30 power are needed, surgical microscope II (Fig 10) was developed. The microscope is for binocular observation through the auditory canal or through an inserted funnel with adequate illumination of the area to be operated on. With the instrument comes a photographic camera which can be attached or removed quickly without any adjustments. Color photos with adequate brightness and a size of 24x36 mm with 1.25 power magnification are obtained. Kolposcope III (Fig 11) features an exchangeable magnifier for 5, 8, 12.5,20, and 32-power magnification, inclination and motive adjustment in the direction of the optical axis, angle tube, connections for the photographic camera, and adequate lighting of the object area; thus it corresponds to the increased requirements of physicians for the early diagnosis of genital carcinoma in women.

Other new developments of the production program of VEB Carl Zeiss, Jena, can only be indicated briefly in this connection. Important for amateur astronomers are: school telescope 63/840, the meniscus (an improvement of the reflecting telescope for amateurs according to Cassegrain) and the parallactic mounting I b. A comparing eyepiece and drawing attachment enlarge the scope of microscopic research. The new Werra model "Werramat" and the new reflecting objective 5.6/1000 will capture the special interest of photographers. The new Apo-germinar, with its optically symmetric arrangement is a special objective for reproduction which will achieve more and better results. A film developer, an attachment mainly for x-ray screen cameras 35 and 70 mm, and for the Zeiss documator system, develops 35 and 70 mm x-ray, fluorapid, and recording films (perforated or unperforated) up to 50 m in length. Other negative films can also be processed.

Illustration Captions

Fig 1. Sonovisor
Fig 2. Supersonic Intensity Meter
Fig 3. High Vacuum Vaporization Plant 2
Fig 4. Pitch Gauge for Lead Screws
Fig 5. Theo 120
Fig 6. Reducing Tachymeter 006 with Station Basis
Fig 7. Stereometrograph with Plotting Pen
Fig 8. Coordimeter
Fig 9. Electrokymograph
Fig 10. Surgical Microscope II
Fig 11. Colposcope III

PRESENT CONDITION AND PLANNED DEVELOPMENT OF THE HUNGARIAN MACHINE-TOOL INDUSTRY

[Following is the translation of an article by Lajos Simonyi in Ujitok Lapja, Vol XIII, No 11, Budapest, 1961, pages 5-6.]

When the goals of our First Five-year Plan became known in 1951, it was obvious that success could be achieved only if our technological level were increased.

Five years passed between 1945 and 1951; and of these years, two were spent in clearing away rubble and three on the Three-year Plan. It became apparent that there was not enough capacity, either in machines or in experts, to increase machine-tool production. We were not able to improve our technology during these five years.

Before 1950 the country had no specialized machine tool factory to produce standardized tools for commercial purposes. Chipping tools were made as a sideline in the Csepel Tool factory and in the Danuvia Machine Tool factory, but this was not enough. The Budapest Chipping Tool Factory (BCTF) was organized in 1950, and a machine tool factory was planned for Bekescsaba but this remained almost entirely on paper.

One of the tasks of our Second Five-year Plan is to improve our machines and lower their average age by buying modern ones. The high capacity of our modern machines will be utilized only if we secure high-capacity, modern tools.

Automation was introduced in the BCTF. The new building at the Bekescsaba CTF serves an ever-increasing demand for chipping machines. Automatic equipment will be installed in the Hungarian Steelware Factory for modernizing our twist drill production during the Second Five-year Plan. This will produce small twist drills (for which there is the greatest demand) without chipping. The apparatus will represent a 40% material saving and increase productivity threefold. It will also improve quality.

A high-capacity automatic machine line is being built at Csepel to produce hard metal-tipped knifes.

The Caliper Factory was created in 1950 to supply us with gages, calipers, and measuring instruments. This factory has scored important successes since then. Nevertheless, there are still unsatisfied demands for calipers, and especially for threaded instruments. This is due to the lack of precision thread-grinding machines. Even so, the Caliper Factory produces indicator watches, caliper gages, depth meters, and other instruments (recently, actimeters) of a quality that is as high as any in the world.

Our specialized tool factories and the Caliper Factory must be developed further. This is necessary if we wish to supply the domestic market with sufficient tools.

Numbered special drawing tools, instruments, and other implements outvalue the commercially available tools several times. Nevertheless, we continue having short supplies of them, too. Most of the capacity of our largest tool factory, the Csepel Tool Factory, goes to the other Csepel factories; very few of its products ever get to other industries. We needed a large-capacity, central tool factory already in the First Five-year Plan. Alternatively other branches have built their own tool factories.

The short supply of production tools endangered planned work and raised the costs of our products. The quality of our products was not the best. This danger was first noticed by the experts dealing with tool production and by the technologists. The Metal Workers Union, the Scientific Society of the Machine Industry, and the "Nepszava" newspaper organized several symposia.

These symposia had important repercussions: the Economic Council resolved to develop tool production, the Ministry created a Tool Designing Committee, etc. But there was no money for the program. All we had was the enthusiasm of the toolers. Their aggressive enthusiasm created a slow progress, which, although limited, is still something.

At our 1951 conference we found that the following six conditions must be met to improve and increase our tool-making capacity.

1. Rational organization of tool factories,
2. An inventor's movement,
3. An increase of theoretical and practical knowledge,
4. Coordination between design and technology,
5. Standardization,
6. Widespread use of modern tool-making technology.

Our progress in the last ten years can be summed up as follows:

1. In our largest factories, where there are tool shops, tool production is generally well organized. There are only a few factories where there is no satisfactory preparation and planning.

2. The inventor movement helps us increasingly each year. What we need most are processes and designs. We received several suggestions using new processes, some of which are applicable for general use. However, their introduction meets resistance, and there are leaders who do not support the introduction of new methods.

3. Progress is satisfactory in the quest for knowledge. Many use the opportunities provided by the State. Both the Budapest and Miskolc universities introduced machine production and technology courses which discuss heat technology, chipping, tooling, instauration, etc. in detail. They deal little with cold processes and the machines required.

4. Our tool designers constantly strive for modern tooling. They are working on designs which satisfy both the new technological

processes and economical production.

5. We are not behind the more developed countries in standardization. Nevertheless, there is much yet to be done, especially in the modernization of our existing standards. Most standards are ten years old. This year we will revise our standards dealing with press-tool houses and their equipment. We hope to have a factory which will make tool instruments, machine tools, and automatic parts.

Pamphlets such as the "Tool and Tool Standards Collection," which was published by the Institute for the Development of Strong Current Installations, help greatly.

I wish to touch upon an area that holds intense interest for the tool makers: tool sets composed of standardized elements. These are becoming more common abroad.

A set consists of many parts which without forming and reshaping can be put together to make a machine. The fit of the elements is insured by a narrow tolerance. Length tolerance is within 0.008 mm, and allowed angle tolerance is 0.005 mm per 100 mm. Hence the basis of the system is the accuracy and fit of the elements. Such sets are being used in the Soviet Union, Czechoslovakia, and East Germany among the socialist countries. In the capitalist countries the English Warthon system is usually used.

In recent years several factories in the tremendously growing Soviet machine industry began to use equipment which can be assembled from standardized sets, especially in the production of prototypes and small sizes. The choice and number of elements was significantly increased. This way, many devices can be built in the same amount of time for any purpose. In one of the mechanical machine factories, a set of 22,000 pieces was used in 1959, and another 16,000 was produced in the same time. From this set (which is designed to have 40,000 pieces eventually), they plan to build 135 devices in the same amount of time. Soviet equipment built from standardized elements aroused great interest at the Standardization Exhibit, Leipzig, East Germany, at the end of 1959. It is expected that the element systems developed by the Technological Institute of East Germany and by the Lenin Works of Plzen, Czechoslovakia, will be shortly revealed.

In those Soviet factories where element-built machines are already working, an estimated 60% of the drilling, milling, lathing, grinding, welding, broaching, measuring, and other processes is already being done by this type of machine. 17,000 such machines were in use in Soviet factories in 1959. This resulted in savings of 1,000 tons of material and 220,000 hours of designing time.

This success induced the Soviets to spread the use of these machines. To this end, the following orders were issued:

1. The introduction of such sets is to start with simpler sets. The sets are to be increased year by year in number and complexity;

2. The production of elements must be begun in several factories, and these factories should cooperate;

3. A Central Loan Service must be set up;

4. Standardization must be continued;

5. A permanent exhibit showing the use of element-assembled apparatuses must be established;

6. Systems of element-made equipment must be exhibited in the Polytechnical Museum.

Great opportunities exist also in the Hungarian machine industry for these devices.

Since the factories that proposed the introduction have bogged down, the Ministry has bought a Warthon set. This set consists of 455 pieces, and two to three devices can be built from its parts at one time. Since this set satisfies only minimal demands, it was given to the Tool Development Institute for study. It is hoped that the Institute will develop a set from which at least six to eight medium complex, medium sized machines can be built at the same time. The first stage of this step has already been carried out: drawings of the most important complementing elements have been finished. A detailed manual for the use of the set has also been made. Since the Institute does not have equipment to produce the elements, they gave their Warthon set to the Caliper Factory, together with the available documentation. The factory also received personnel and material for this task. Now it is up to them to produce the complementing elements. These will bring the number of elements to 1100.

Although we showed progress in the development of sets, our progress is very slow. We must speed the production of the already designed elements. The design of other elements must be pursued at full speed. After producing a large number of elements -- at least 5000 -- a loan service must be organized. The utilization of this service will then determine how fast and far we shall develop our sets.

Caption of illustration [not reproduced because of poor quality]: N-3 tap drills being made on the new centerless grinder. Using a new process, 1500-1600 pieces are being made per shift.

DATA ON THE HUNGARIAN TELECOMMUNICATIONS RESEARCH INSTITUTE

/Following is the translation of an article by Geza Simonffy in Muszaki Elet (Technical Life), Vol XVI, No 14, Budapest 1961, page 10./

The Telecommunications Research Institute (TRI) is one of the most important research bases of our communications industry. What news are being made in the laboratories of this important institute?

Imre Brody Laboratory

The most interesting results obtained in this laboratory in recent times were those concerned with tungsten research. Therefore, instead of covering the entire field of work of this laboratory, we visited the tungsten department only.

"I have been in tungsten research for decades," says the head of the department, Academician Dr Tiviadar Millner. "Recently, at the International Powder Metallurgy conference in Eisenach, I gave a lecture on the results achieved together with my colleagues in tungsten research in the past few years."

"Tungsten metal, the lamps, the radio tubes, neon tubes, the material of the filament are developed industrial products. Why is there still research in tungsten?" we asked.

"The lifetime of the lamp depends on that of the tungsten filament, which, in turn, can be increased only by scientific methods. Today's lamps are extraordinarily uniform in quality, but if we still improve their uniformity, this will bring profit to the economy on one hand and further the tendency toward thinner filaments and radio tubes on the other hand. Research is needed to produce thinner filaments with the same regularity.

"The best properties of the tungsten filament are still being achieved by following the 1933 patent of Tury-Millner. The good properties of these tungsten filaments are being insured by the presence of potassium, silicon and aluminum traces. These traces are so minute that they can be found only barely by analytical methods, and their quantity or ditribution cannot be measured. Only indirect tests give indication of them."

"What are the results of your latest research?"

"A few, internationally renown results were made in our department in recent years. We proved that an unstable species of tungsten, beta-tungsten, plays an important role in tungsten powder production, and through this, in the formation of the properties of the tungsten.

Tungsten is obtained by reducing its oxide with hydrogen. In this process, approximately one-millionth of one percent of potassium, silicon and aluminum gets into the tungsten metal. This small contamination creates the technological properties of the material. This strange process is instituted by nature with the aid of the so-called secondary beta-tungsten. We succeeded in proving that in tungsten wires -- unlike in other metals -- the formation of the permanent metal structure (the recrystallization) is not uniform but takes place at greatly varying speeds. We found that almost everywhere a surprisingly high (20%) stretching ability was found in tungsten wires at room temperatures. Another finding is that the high-temperature (2500°) stretching of tungsten wires is caused by foreign materials found on the crystal boundaries. The same materials, when they are evenly distributed in the crystal, give good properties.

"These results and other relevant findings are the basis of our patents that were obtained together with the Egyesult Izzo (United Lamp Factory). Our research was extended to the improvement of the properties of aluminum oxide, which is used for the insulation of the heating tungsten wires in radio tubes. Here, too, small contaminations, analytically barely detectable, play an important part."

The Transmitter Tube Laboratory

Dr Zoltan Tomasek, head of the laboratory, and Dr Istvan Koncz stated that the laboratory has two main functions: to make new types of tubes for the industry (as short term work) and to do fundamental research and solve problems of theory.

The latest tendency in tube production is to replace glass with ceramics. The first domestic ceramic base tubes have been made here recently. The material is very pure, well-baked aluminum oxide, which keeps vacuum and does not produce any gases while in operation.

In the recently developed ultra-short wave series the bulb has almost disappeared, the outer envelope is metal and glass or ceramics. The metal and glass covered tube which operates at up to 300 watts, is already being produced by the transmitter tube factory.

The metal and ceramic-enveloped tube has a capacity of 500 watts, has a length of only 8 cm (as opposed to 42 cm of the old type) and a vacuum volume of 5 cm^3 (instead of 5000 cm^3). The tube is operative in the No. 5 TV zone (that is, up to 900 Mc.) The old tubes worked only up to 200 Mc. The distance between the cathode and the grid is only a few hundredths of a millimeter. This is very hard on the material, for the filament has to retain its shape at 2000° for 1000 hours.

The grid stayed cold in the larger, older tubes, but it becomes hot and emits electrons of its own in the new ones. A grid coating was found that prevents this and retains its protection for 500 hours. The bulb of the ceramic tube was given forced-air cooling. This is far better than water cooling, for water may not be available in TV antennas located on high hilltops. This tube can be used for FM transmitters, ships, planes, and in smaller transmitters in rockets as well. Due to

the high frequency and band width the color TV transmitter can be built only by using such tubes.

The other new development in the laboratory is the ignitron tube, developed in 1960. This device, which has no inertia, is useful for controlling welding machines and motors, for magnetization and safe coupling of high current points. The tube has a metal body (made of domestic materials) and is unique in its type in that it is soldered instead of welded together. Its ignition head was developed by the Electrical Research Institute. The tube rectifies or continuously regulates up to 50 amperes. It couples peak current up to 5000 amperes. The tube is water-cooled, the air-cooled variety is under construction. It is used by the Ganz Ammeter Factory for magnetization of the magnets of kilowatt-hour meters, and in aluminum spot-welders at Csepel. It can be used as an automatic element in any machine tool for revolution regulation.

One more interesting result was mentioned by the heads of the laboratory. A special analytic atlas was made last year in the laboratory for the determination of rare earths. It aroused great interest at the International Spectroscopic Congress at Veszprem, Hungary. The publication of the atlas is pending.

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Figure 1. 50 ampere air-cooled ignitron.
Figure 2. 300 ampere ceramics-enveloped ultra-short wave radio tube.

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